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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/233,377	01/18/1999	GURTEJ S. SANDHU	MI22-1114	7580

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EXAMINER

PHAM, THANHHA S

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 12/19/2001

17

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/233,377

Applicant(s)

SANDHU ET AL.

Examiner

Thanhha Pham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 September 2001.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 24, 45 and 52-58 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 24, 45 and 52-58 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 15.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 24, 45 and 52-58 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claim 24,

Line 9, "the titanium silicide layer of the first crystalline phase" lacking of antecedent basis should be changed to "the titanium silicide layer substantially of the first crystalline phase"

Line 10, "said titanium metal silicide layer" lacking of antecedent basis should be changed to "said titanium silicide layer"

With respect to claim 45,

Line 8, "the refractory metal" lacking of antecedent basis should be changed to "the refractory metal silicide comprising the first crystalline phase"

With respect to claim 56,

Lines 1-2, "the compressive stress inducing layer" lacking of antecedent basis should be changed to "the compressive stress inducing material layer"

With respect to claim 57,

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Lines 1, "the refractory metal silicide layer " lacking of antecedent basis should be changed to "the refractory metal silicide"

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

1. Claims 45 and 55-58 are rejected under 35 U.S.C. 102(a) as being anticipated by Kawamura et al [JP 8139056].

Kawamura et al teaches the claimed method of forming a refractory metal silicide comprising steps:

providing a compressive stress inducing material (11, silicon oxide, fig 2A) over a first side of a substrate (1);

forming a refractory metal silicide (6,7, Titanium silicide C49, fig 2B) over the compressive stress inducing material (11), the metal silicide comprising a first crystalline phase (C49);

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after forming the refractory metal silicide, annealing the refractory metal silicide comprising the first crystalline phase to form a refractory metal silicide of a second crystal phase (6,7, titanium silicide C54, fig 2C).

2. Claims 45 and 57-58, as being best understood, are rejected under 35 U.S.C. 102(a) as being anticipated by Kawamura et al [JP 8139056].

Kawamura et al teaches the claimed method of forming a refractory metal silicide comprising steps:

providing a compressive stress inducing material (9, fig 5B) over a first side of a substrate (1);

forming a refractory metal silicide (6,7, Titanium silicide C49, fig 5B) over the compressive stress inducing material (9), the metal silicide comprising a first crystalline phase (C49);

after forming the refractory metal silicide, annealing the refractory metal silicide comprising the first crystalline phase to form a refractory metal silicide of a second crystal phase (6,7, titanium silicide C54, fig 5C).

3. Claims 24 and 52-54, as being best understood, are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Cabral et al [US 5,828,131].

Cabral et al, fig 1-16 col 1-12, discloses the claimed method of forming a refractory metal silicide comprising steps:

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forming a titanium metal layer over a silicon containing substrate and providing compressive stress inducing atoms being larger than silicon atoms (e.g. W in Ti-alloy, col 11-12);

after the providing, first annealing the titanium metal layer containing the compressive stress inducing atoms to form a titanium silicide layer substantially of a first crystalline phase (C49);

second annealing the titanium silicide layer of the first crystalline phase under conditions effective to transform said titanium silicide layer to a more dense layer substantially of a second crystalline phase (C59).

With respect to claims 53-54, Cabral (col 10 lines 15-29 and col 3 line 60-64) teaches Ge (elements group IVA) can be used additionally to the Ti-alloy for forming the titanium silicide. Those skilled in the art would recognize that Ge can function as compressive stress inducing atoms in forming silicide.

### ***Response to Arguments***

4. Applicant's arguments filed 9/28/01 have been fully considered but they are not persuasive.

Regarding Applicant's argument on page 7 that "Kawamura does not disclose that both the compressive stress inducing material and the refractory metal layer are formed on or over the same side of the substrate", the argument is not persuasive because this is not what being claimed in claim 45.

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Regarding to Applicant's argument on page 8-9, contrary to Applicant's argument, Cabral teach usage of Ti-alloy (e.g. W) before annealing to form a titanium silicide. The W atoms functioning as compressive stress inducing atoms in the Ti-alloy will lower the temperature for forming titanium silicide of substantially of the second crystalline phase C59.

### ***Conclusion***

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanhha Pham whose telephone number is (703) 308-

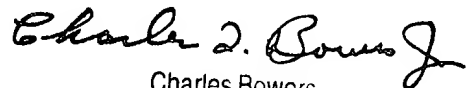
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6172. The examiner can normally be reached on Monday-Thursday 8:00 AM - 7:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bowers Charles can be reached on (703) 308-2417. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-3432 for regular communications and (703) 308-7725 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Thanhha Pham  
December 17, 2001



Charles Bowers  
Supervisory Patent Examiner  
Technology Center 2800